

CLAIMS

1. Device for increasing the perceived bandwidth in an audio signal path with limited bandwidth, comprising: an input terminal (1) for connecting an audio signal, an output terminal (2) for connecting a speaker unit for generating an acoustic signal, and a splitter (3) adapted to divide the audio path from the input terminal (1) into two branches, a first branch (4) for passing a first part of the audio signal, and a second branch (5) for processing a second part of the audio signal, the second branch comprising means (7, 8, 9) for producing harmonics of the audio signal; and a combiner (6) for adding the harmonics produced in the second branch (5) to the first part of the signal in the first branch (4) at the output terminal (2), characterised in that the means for producing harmonics comprises a harmonic generator (8) for producing out-of-band harmonics.
2. Device according to claim 1, characterised in that the means for producing harmonics further comprises a filter (7), and an adjustable amplifier (9).
3. Device according to claim 2, characterised in that the filter (7) is arranged to separate the upper portion of the pass band as an input to the harmonic generator (8).
4. Device according to claim 1, 2 or 3, characterised in that the harmonic generator (8) comprises a nonlinear circuit.
5. Device according to claim 1, 2 or 3, characterised in that the harmonic generator (8) comprises a digital signal processor ,DSP.
6. Device according to any one of claims 1 to 5, characterised in that the means for producing harmonics is arranged to add second harmonics.
7. Device according to any one of claims 1 to 5, characterised in that the means for producing harmonics is arranged to add even harmonics.
8. Device according to any one of claims 1 to 7, characterised in that the audio signal is a ring signal.
9. Device according to claim 8, characterised in that the audio signal is a polyphonic ring signal.
10. Device according to any one of claims 1 to 7, characterised in that the audio

signal is a speech signal, such as GSM or Bluetooth™ audio.

11. Device according to any one of claims 1 to 10, characterised in that the first
branch (4) is provided with means (10) for providing a delay or a phase shift.
- 5 12. Communication apparatus, characterised by including a device for increasing the
perceived bandwidth according to any one of claims 1 to 8, 10 and 11.
- 10 13. Communication apparatus, characterised by including a device for increasing the
perceived bandwidth according to claim 9, comprising a polyphonic sound effect
generator for producing the polyphonic ring signal.
- 15 14. Communication apparatus according to claims 12 or 13, characterised in that the
communication apparatus is a portable telephone, a pager, a communicator or an
electronic organiser.